GAPS, NOGAPS, TRANSIENTS
Engineering & Scientific Program
Portable

GAPS, NOGAPS and TRANSIENTS are a group of programs which aid in the design of charge-coupled devices (CCD's) by analytically investigating proposed device geometries. All three offer users more sophisticated CCD models than were previously available.

Key words and phrases: circuit design, charge-coupled devices (CCD's), charge transfer, electrostatic potential.

GAPS, NOGAPS and TRANSIENTS are programs which aid in the design of charge-coupled devices (CCD's) by analytically investigating proposed device geometries.

GAPS analyzes the electrostatic potential distribution and fields in two-dimensional CCD models characterized by gaps between the CCD electrodes. GAPS examines the dependence of the potentials and fields in CCD's on various design parameters. By using depletion layer approximation, GAPS linearizes the potential equations—which the program can solve numerically.

Similarly, NOGAPS analyzes the electrostatic potential distribution and fields in two-dimensional CCD models characterized by electrodes so close together that they can be assumed to touch.

TRANSIENTS numerically solves nonlinear, partial-differential equations describing charge transfer in CCD models. The TRANSIENT CCD model is an improvement over previous program models in that it includes field-aiding of charge transfers and more realistic boundary conditions.

Published references:

NOGAPS—"The Potential in a Charge-Coupled Device With No Mobile Minority Carriers and Zero Plate Separation," McKenna and Schryer, Bell System Technical Journal, Vol. 52, pgs. 669-696, 1973.

GAPS—"The Potential in a Charge-Coupled Device With No Mobile Minority Carriers," McKenna and Schryer, Bell System Technical Journal, Vol. 52, pgs. 1765-1793, 1973.

TRANSIENTS—"Analysis of Field-Aided Charge-Coupled Device Transfer," McKenna and Schryer, Bell System Technical Journal, Vol. 54, pgs. 667-685, 1975.

Hardware requirements: Portable

Programming language: FORTRAN

License fee:
$30,000 (per central processing unit)

For more information, contact the Technology Licensing Manager, AT&T, P.O. Box, 25000, Greensboro, North Carolina 27420
or call (919) 697-6530

TOLERATE
Engineering & Scientific Program

Portable

TOLERATE is a statistical program for assigning device and component tolerances based on a form of circuit yield analysis which eliminates the risk of over-design inherent in a worst-case design.

Key words and phrases: circuit design, statistics, tolerances.

TOLERATE is a computer program which uses Monte Carlo analysis to compute component and device tolerances for maximum circuit yield, while avoiding over-design.

Briefly, TOLERATE ranks passive and active elements in order of circuit yield sensitivity. The program then provides a systematic set of revisions in component specifications which converge on maximum circuit yield.

Intermediate results from this analysis describe the trade-off between restricted component and device tolerances and circuit yield. This intermediate output is useful for precise cost analysis of such factors as circuit tuning and selection of manufacturing technology.

TOLERATE's final output identifies the optimum choices of nominal element values for both design centering and tolerances.

Published references:

"New Statistical Method for Assigning Device Tolerances," Elias, N.J., 1975 Symposium on Circuits and Systems, Boston, Mass., April 1975.

"CAD in Support of Product Development," ELECTRO76 Professional Program, May 11-14, 1976.

Hardware requirements: Portable

Programming language: FORTRAN

License fee:
$20,000 (first central processing unit)

For more information, contact the Technology Licensing Manager, AT&T, P.O. Box, 25000, Greensboro, North Carolina 27420 or call (919) 697-6530

SCAMPI Engineering & Scientific Program

IBM 360/370

SCAMPI (Statistical Characterization and Model Parameter Interpretation) is a program designed to statistically characterize dc bipolar transistor model parameters. SCAMPI differs from earlier characterization methods in that it is both automated and general enough to be applied to any bipolar device type.

Key words and phrases: circuit design, device model parameters, statistics.

SCAMPI is designed to determine certain statistical information on dc bipolar device model parameters. SCAMPI's output is statistical data that predict variations in transistors' electrical terminal behavior caused by normal variations in manufacture. The output includes information on parameter tracking that is prevalent in modern integrated circuits. This statistical information is a prerequisite for the successful application of Monte Carlo analysis to circuit design.

SCAMPI develops statistical characterizations by operating on measurements of large populations of nominally similar transistors. In each device SCAMPI then computes parameters for an extended Ebers-Moll model. The results of these computations are statistically summarized.

SCAMPI differs from earlier statistical characterization methods in that it is wholly automatic from the measurement phase of the operation through final statistical summary of derived model parameters. The program is also general enough to be directly applicable to any bipolar device type.

Published references:

"Techniques for Statistical DC Modeling of Bipolar Transistors," IEEE International Symposium on Circuits and Systems, pages 725-729, April 1974.

"Statistical Analysis for Practical Circuit Design," IEEE Transactions on Circuits and Systems, Vol. CAS-22, No. 2, pages 100-108, February 1975.

"CAD in Support of Product Development," ELECTRO76 Professional Program, pages 1-7, May 11-14, 1976.

Hardware requirements: IBM 360/370

Programming language: FORTRAN IV

License fee:
$30,000 (per central processing unit)

For more information, contact the Technology Licensing Manager, AT&T, P.O. Box, 25000, Greensboro, North Carolina 27420
or call (919) 697-6530